Riel Converter Station
Winnipeg

Site Selection and Environmental Assessment Status Report

Conawapa to Winnipeg
Power Transmission Complex

August 1991

manitoba hydro

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Manitoba Hydro's Development Plan

Manitoba Hydro is currently pursuing a number of long-term capital investment and conservation initiatives. These are intended to meet projected consumer needs into the next century and to improve the security and reliability of the province's electrical system.

Part of Hydro's capital plan is to build the 1390 megawatt Conawapa Generating Station on the Nelson River, downstream from the soon-to-be-completed Limestone project. This facility will generate needed power for both projected demand within Manitoba and committed sales to Ontario and the United States.

Also proposed is development of the Conawapa-Winnipeg Power Transmission Complex, known technically as the Bipole III Complex.

The Conawapa-Winnipeg Power Transmission Complex

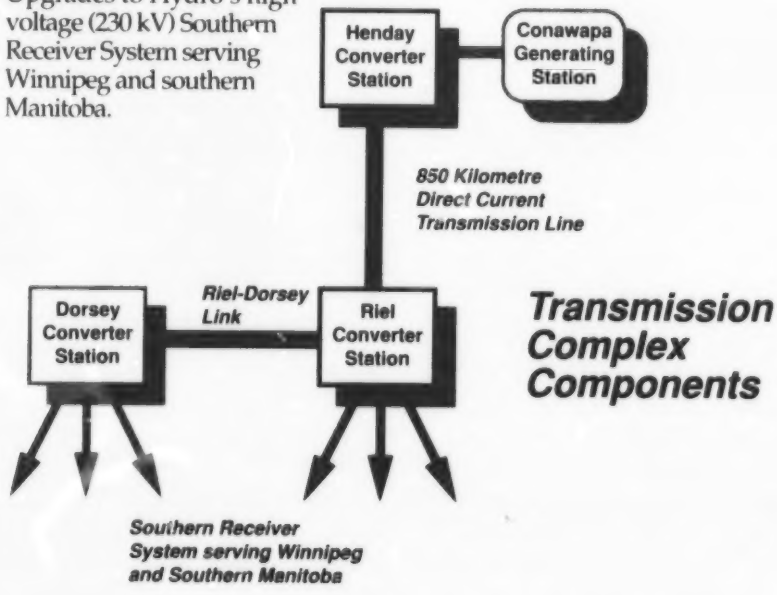
This major development includes five interrelated transmission and conversion facilities:

- An upgrade of the existing Henday Converter Station on the Nelson River;
- An estimated 850-kilometre HVDC (High Voltage Direct Current) Transmission Line from Henday to Winnipeg, known as Bipole III;
- A new converter station east of Winnipeg, known as Riel Converter Station;
- A transmission Link between Riel and the existing Dorsey Converter Station northwest of Winnipeg; and
- Upgrades to Hydro's high voltage (230 kV) Southern Receiver System serving Winnipeg and southern Manitoba.

Purposes

This Transmission Complex has three purposes:

- To convey Conawapa or other northern power to Hydro's receiving system in southern Manitoba;
- To increase the flexibility of Hydro's transmission network during normal operations; and
- To improve Hydro's capacity to service its customers in the event that part of its network is disrupted by an outage or by maintenance requirements.


Henday Converter Station
Conawapa Generating Station
850 Kilometre Direct Current Transmission Line
Dorsey Converter Station
Riel-Dorsey Link
Riel Converter Station
Southern Receiver System serving Winnipeg and Southern Manitoba

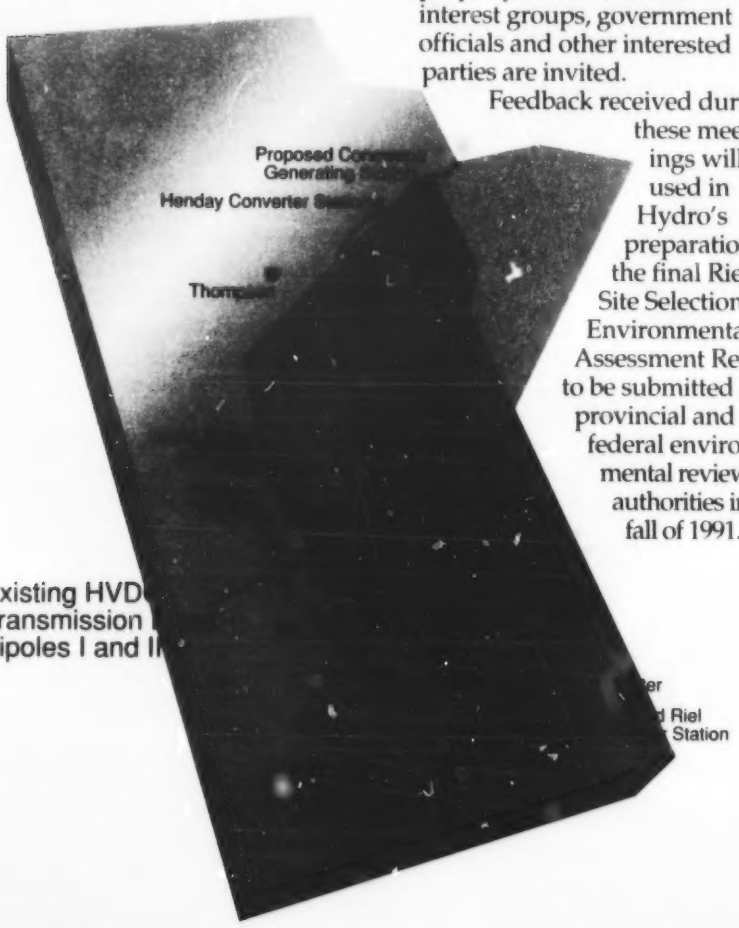
Transmission Complex Components

The Riel Station Study

This booklet describes work done to date on the Riel Converter Station component . Over the past year, Manitoba Hydro and its consultant team have been engaged in a site selection and preliminary environmental assessment study for the Riel Converter Station.

Eight potential locations for the proposed Riel Station have been identified and compared. A preferred site, known as the "Deacon" site, is proposed.

Manitoba Hydro invites public discussion and comment on its analysis and conclusions.



Public Review and Consultation

This status report provides an information base for community consultation on the Riel proposal. More detailed information will be available from Hydro's Environmental Management Division as the study proceeds.

Beginning in August 1991, Hydro's representatives will hold a series of community open houses and other meetings to discuss siting and environmental issues concerning the proposed Riel Station. Area residents, property owners, environmental interest groups, government officials and other interested parties are invited.

Feedback received during these meetings will be used in Hydro's preparation of the final Riel Site Selection and Environmental Assessment Report to be submitted to provincial and federal environmental review authorities in the fall of 1991.

Meetings and open houses will be used to provide information and opportunities for public comment on the Riel Converter Station studies.

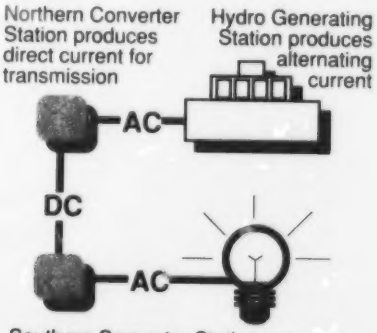
Role of the Riel Converter Station

Delivery of power from the proposed Conawapa Generating Station will require a new high voltage direct current (HVDC) transmission line to Winnipeg, known as Bipole III. Hydro is presently examining alternative corridors for this line.

The Riel Converter Station will be the southern terminus of Bipole III.

Riel's basic electrical functions will be the same as those of the existing Dorsey Converter Station northwest of Winnipeg. These functions are to receive direct current (DC) power and convert it to alternating current (AC) power and to transform the AC power for distribution to provincial and to out-of-province customers.

Apart from its specific role in conversion and transformation of power from Conawapa, Riel will fulfil a number of broader system functions as well:



Southern Converter Station converts power back to alternating current for business, domestic and industrial use

- Riel will provide increased capacity to distribute power to Winnipeg and to the Southern Receiver System, including its interconnections to other utility systems;
- Riel will facilitate the ultimate development of a ring of transmission lines around Winnipeg to ensure that major area transformer stations are served by both a high-capacity power source and a comparable back-up.

Initially, nine lines will feed power to and from the station along four existing rights-of-way. Future development needs could add up to another nine lines and, depending on the site chosen, these lines could require additional rights-of-way.

System Needs

Delivery of power to southern Manitoba is becoming increasingly dependent on the Dorsey Station. Prior to the present development of Limestone Generating Station, approximately 55% of Hydro's generating capacity had been supplied to Dorsey along a single right-of-way shared by the two existing HVDC lines, known as Bipoles I and II.

Although potentially vulnerable to a major accident or other disruption, this geographic concentration of delivery facilities has been manageable because Hydro has had sufficient alternative capacity to adjust the flow of power through other sources and system interconnections.

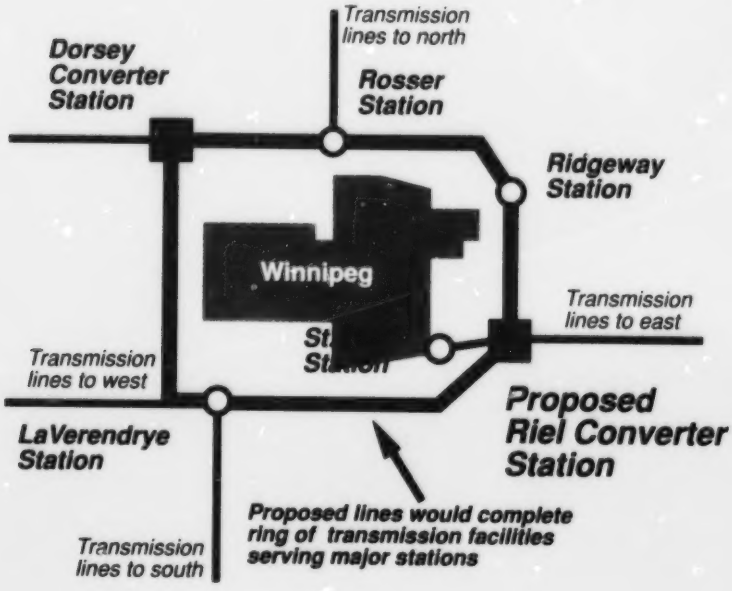
However, the situation will change with completion of Limestone, and would change further after Conawapa is in service, if the new Bipole III or Riel Station were located in close proximity to the present concentration of facilities. With the location of Bipole III in the same corridor as Bipoles I and II, about 80% of system generating capacity would be vulnerable to a single accidental or natural event that could disrupt all the facilities. In other words, major long term power outages could result.

Accordingly, for reasons of system security, it is important that a reasonable geographic distance be established between the Riel and Dorsey stations, and between the existing Bipoles I/II and Bipole III.

Future load growth will also affect system reliability and flexibility. The Southern Receiver System's high voltage transmission lines from Dorsey to major Winnipeg-area transformer stations tend to be concentrated in the northern and western outskirts of the city. A temporary loss of line power in this area could result in outages affecting a large part of the wider system.

It is important, therefore, that the proposed Riel Station be located and linked to Bipole III, Dorsey Station, and the Southern Receiver System in ways that maximize its potential to improve network security, reliability, and flexibility. For example, in the event of outages involving Dorsey or Bipoles I and II, development of transmission links between Riel/Bipole III and other major stations in the Winnipeg area would improve back-up power supply to these stations. Similarly, an HVDC link between Riel and Dorsey would enable direct switching of power between the existing bipoles and Bipole III. This is the same kind of operation already provided for at Dorsey between Bipoles I and II.

Development of Riel Station, therefore, would permit a substantial proportion of the HVDC system's capacity to be maintained even in the event of disruption in an HVDC line.



Station Design

Final engineering design for the proposed Riel Converter Station will not be completed until 1994. Thus, the facility's actual layout and appearance, and the specific nature of its technology and equipment, are still in the development stage. It is expected, however, that Riel's basic size and configuration will be similar to the Dorsey Station.

The Dorsey Station switchyard and transmission facilities are similar to those proposed for the Riel Site.

The Ground Electrode

In addition to construction of the station itself, Riel will require development of a ground electrode facility. The electrode is essentially a metal ring about 300 metres in diameter, set in the ground some 20-50 kilometres from the station and connected by a low voltage feeder line.

The purpose of the electrode is to enable continued operation of Bipole III in the event of a loss of one of its poles. It will be located and designed to avoid impacts on pipelines and other nearby metallic or electrical installations.

Once Riel is sited, a suitable location for the electrode and feeder line will be identified and their environmental impacts will be assessed.

Potential Impacts

The system needs outlined in the previous section have implications for the impacts Riel may have on the environment and where the station should be located.

Station Construction

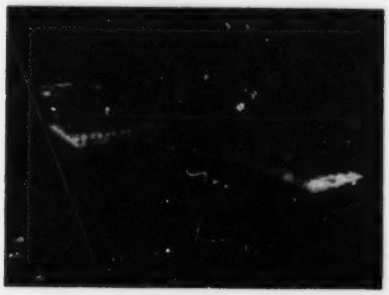
The station is scheduled to begin service in the year 2000, following a five-year construction period, including communication installations and commissioning activities. Additional equipment will be installed at Riel during the following two years.

The project will create an estimated 16,000 person-months in direct employment, representing more than 1,200 engineering and construction jobs. Total costs are projected to be approximately $700 million in Year 2000 dollars.

Station Operation

Riel Station essentially will be a large-scale, light industrial facility. It will be clean compared to most manufacturing or processing industries.

The peak daytime work force is expected to be about 50 persons. The station is likely to be staffed 24 hours a day.



Aerial view (left) of the Dorsey Station Complex with 500 kV Switchyard in foreground .

Dorsey Station Bipole II converter building and transformers (below).

Environmental Impacts

All potential adverse environmental and socio-economic impacts resulting from normal construction and operational activities are expected to be avoided entirely or reduced to acceptable limits, using known technology.

Waste production generally will be limited to construction, maintenance and staff domestic activities. Construction and operation of Riel will involve noise at the site, station lighting visible from outside, and increased traffic on nearby roads. Development of rail spur access will be necessary to transport some of the larger equipment components to the site. These and all other potential environmental impacts of station construction and operation will be covered in the environmental impact assessment. At this time, however, a few issues of known public concern should be discussed.

Potential Pollutants

Discharges or effluents associated with the station and its lines will be non-toxic or insignificant. Inputs and outputs of the power conversion process will be limited to electrical energy and to heat from the station equipment and facilities. The latter will be controlled by closed-loop cooling systems.

Significant volumes of equipment cooling oil (none of which will contain polychlorinated biphenyls or PCBs) and various controlled substances (for example, cleaning solvents and electrolytes for storage batteries) will be used on the site. As with Hydro's other stations, monitoring, safety and impact management programs will be in place to govern the handling of such substances and to prevent or control fires, spills or other accidents. Should oil or chemical spills occur, however, potentially adverse environmental effects will be prevented or minimized through the use of Hydro's established monitoring, containment and clean-up measures.

Electric and Magnetic Fields

As with any electrical equipment, electric and magnetic fields (EMF) will occur at the station and along associated transmission lines. To date, the weight of scientific evidence on this subject has not established any cause-effect link between EMF exposure and adverse effects on human health. In recognition of the public's concern, Hydro will continue to measure and predict EMF levels at its own facilities, to conduct its own EMF research and to monitor world-wide scientific studies on the subject.

Wherever Riel is located, the station will contain the same facilities and have the same essential size and configuration. If ongoing research provides scientific evidencce that indicates a need to modify existing practices, Manitoba Hydro will take whatever prudent measures are required to protect public and employee health and safety. Measures will be taken during project design to mitigate the potential for electronic interference from EMF.

Land Use and Property Impacts

The main distinction between Riel and most other free-standing industrial facilities is that the station will be at the hub of a web of high voltage transmission lines. The location and development of the station facility, therefore, also involves siting and development of the transmission lines associated with it. Thus, Riel's potential impacts will extend beyond the station's fenced area — including concerns regarding nearby land uses, adjacent properties and their values, aesthetics and general enjoyment.

To mitigate these impacts Hydro will provide adequate space for ingress and egress of connecting transmission lines and for future development. To do this, a site considerably larger than the area initially occupied by the station itself will be required.

Typical high voltage AC transmission line.

A set of functional, technical, environmental and land use criteria was established for selection of the Riel Station site.

Functional Criteria

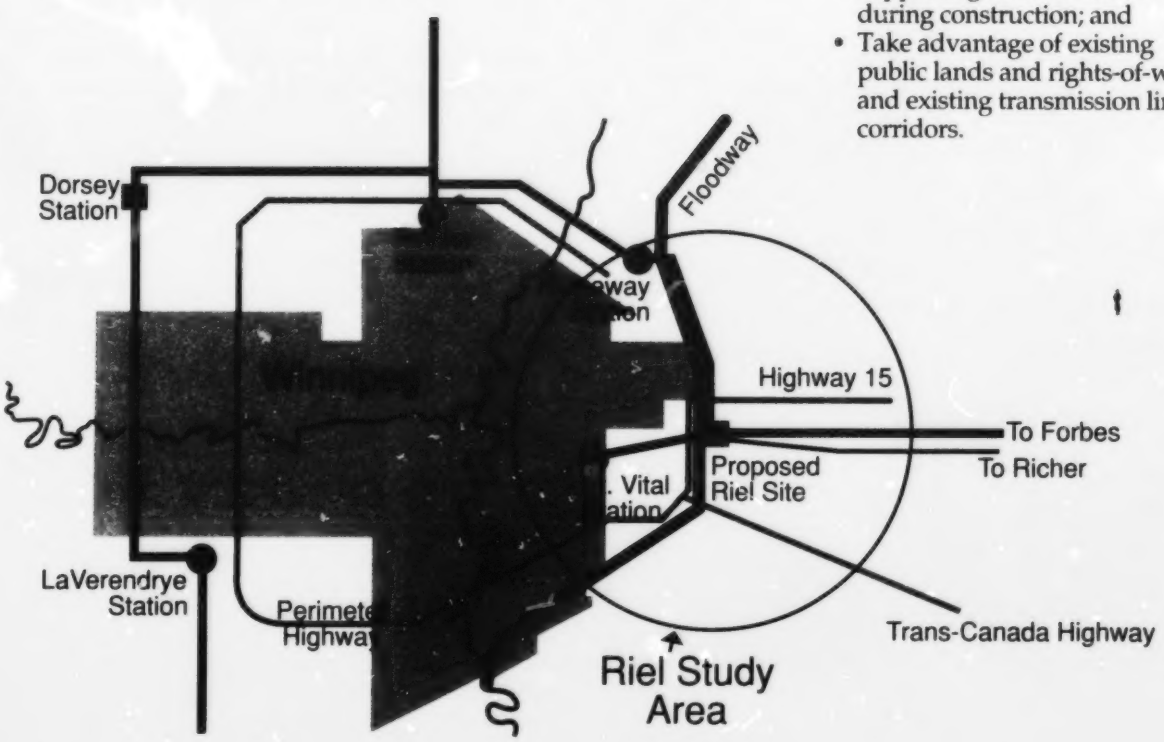
Riel should be located:

- Within reasonable proximity to the Winnipeg load centre;
- To minimize consequences of outages on the 230 kV Southern Receiver System;
- To reduce the risk of a simultaneous failure of Dorsey and Riel;
- To facilitate early development of the transmission ring around Winnipeg; and
- To facilitate connection to the existing Dorsey-Forbes and Ridgeway-St. Vital/Richer lines.

Technical Criteria

The Riel site should:

- Ensure a substantial buffer between the station complex and associated transmission lines, and unrelated adjacent land uses;
- Ensure adequate physical separation between the eight 230 kV lines ultimately exiting the yard;
- Accommodate necessary connections to existing and future transmission line rights-of-way;
- Have access to all-weather arterial roads, heavy rail service, and major communications systems;
- Offer feasible opportunities for developing water supply and sewage disposal services;
- Have access to services and supporting infrastructure during construction; and
- Take advantage of existing public lands and rights-of-way, and existing transmission line corridors.



Environmental and Land Use Criteria

Riel should:

- Avoid any high priority biophysical features that may be encountered.
- Avoid sensitive land uses and socio-economic conditions, including high density urban or suburban development, gravel and aggregate resources, airstrips, recreational facilities, cemeteries and the like.

General Location: The East Side of Winnipeg

Considering system needs and site selection criteria, Hydro analysts concluded that the station should be located on the east side of Winnipeg. The main advantages associated with this general location were:

- Proximity to existing and future domestic and export loads;
- Capability to improve the balance and reliability of the Southern Receiver System, including the future implementation of the urban transmission ring concept;
- Sufficient distance from Dorsey to reduce the risk of a common failure of both stations as a result of tornado, aircraft crash or other catastrophic events;
- Proximity to existing, partially-developed Hydro rights-of-way;
- Existence of several, sufficiently-sized sites in the vicinity of regional transportation, communications infrastructure and a large, skilled work force.

Due to this combination of advantages, general locations in other parts of the urban area and locations at some distance from Winnipeg were rejected.

The Study Area in Brief

For some years, Manitoba Hydro has owned 74 hectares of land in the area with the intent of using it for a new converter station. This is known as the "Deacon" site.

Consistent with current federal-provincial regulatory requirements, Hydro has now examined possible alternative sites and compared them to the Deacon site. For this purpose, Hydro established a study area, defined as a circle with a radius of 10 kilometres, with the Deacon site at the centre.

The study area encompasses portions of the City of Winnipeg and four rural municipalities. Within this area, no major differences were found in biophysical features, such as topography, climate, soil conditions, ground water hydrology, natural vegetation, and wildlife. Land use is characterized by predominantly good quality agricultural land and urban and rural residential development in specific locations.

Opportunities and Constraints

Candidate sites were located by considering a number of opportunities and constraints primarily based on land use.

Opportunities largely involved existing and future transmission line corridors and undeveloped land parcels of suitable size.

Constraints were numerous, with the critical constraint being existing and potential uses that may be incompatible with converter station operation. These include residential development, airfields, certain types of infrastructure and utilities, aggregate resources and sand and gravel operations, recreation and tourism amenities, and other potentially sensitive sites. The preferred site for Riel Station would have to avoid or minimize conflicts with these constraining land uses.

On the basis of known opportunities and constraints, a total of eight options, including Deacon, were identified within the study area and then comparatively evaluated.

The Preferred Deacon Site

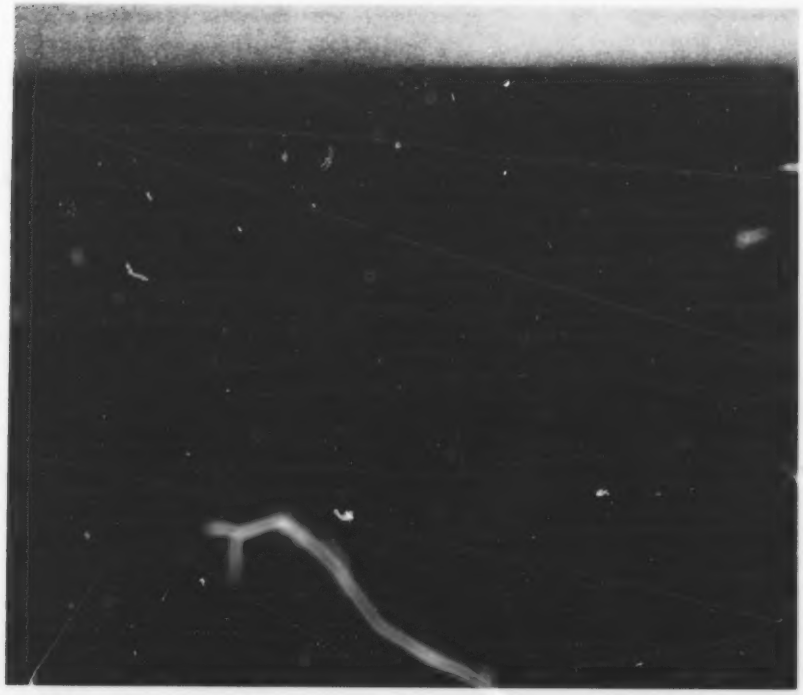
The Deacon site is located just east of the Winnipeg Floodway and Provincial Road 207 (Deacon Road) and immediately north of the City of Winnipeg's Deacon Water Supply Reservoir.

The original site of 74 hectares will be expanded as needed by acquiring adjacent property north towards Sutherym Road and/or west into the Floodway right-of-way.

The Deacon site possesses a number of inherent advantages:

- It is buffered from existing and future constraint areas and other sensitive land uses on the west and south by the Floodway and Reservoir.
- The site is at the critical junction of three major existing transmission line rights-of-way, most of which are partially developed:
  - A 200-230 metre-wide reserve along the Winnipeg Floodway which currently contains two Hydro lines to the north, but is vacant south of the Reservoir.
  - Hydro's 230 metre-wide Riel-Vivian corridor, extending easterly from the Floodway about 35 kilometres to the hamlet of Vivian, which at present is only occupied by the Dorsey-Forbes Manitoba-United States Interconnection.
  - A 275 metre-wide right-of-way from a point northeast of Deacon to the St. Vital Station.

Consequently, the Deacon Site offers a significant advantage in minimizing the need to acquire new rights-of-way which would entail new land use and property impacts. There is sufficient space within these corridors to accommodate all of the new transmission lines included in the long-term development concept for the Riel Station and the urban transmission ring.



Aerial view of the Deacon site looking north with floodway shown on left and water reservoir in foreground.

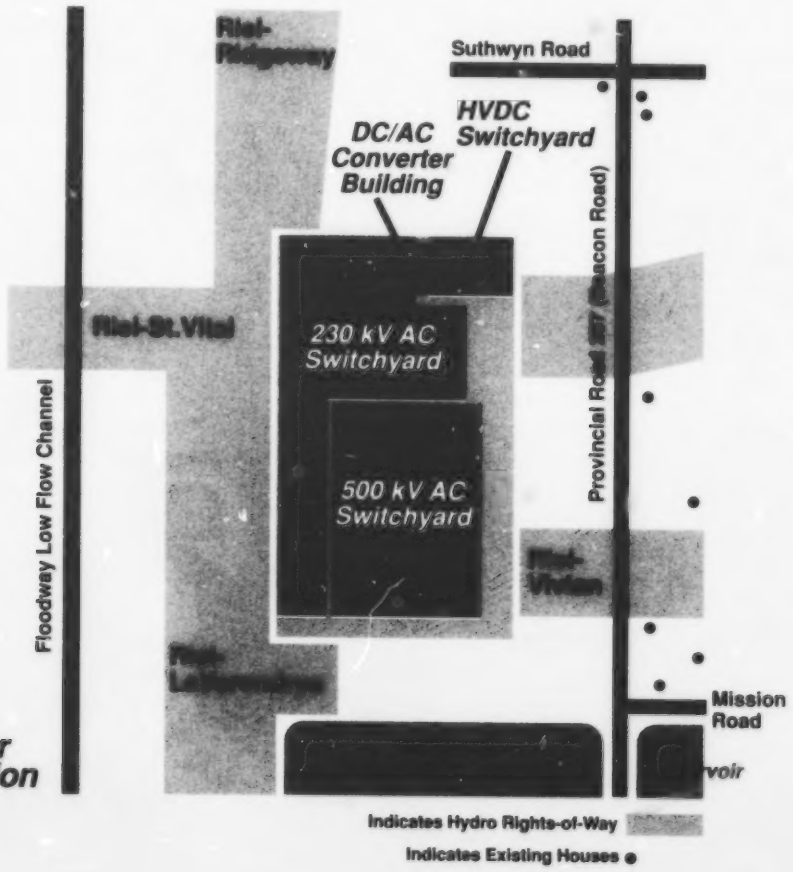
Deacon's location at this junction also facilitates future development of transmission lines to committed and potential long-term export markets in the United States and Ontario.

- Deacon is the most economical location to connect the existing Dorsey-Forbes and Ridgeway-St. Vital lines to Riel Station. These connections will improve system reliability by enabling transmission of power along the two lines from either Dorsey or Riel.
- Deacon would enhance the security and balance of southern power supply by placing Riel roughly diametrically opposite the Dorsey Station, as well as between Hydro's St. Vital/LaVerendrye facilities to the south and the Ridgeway/Rosser stations to the north.
- The station's visual impact would be limited in light of the area's relatively modest development and the presence of existing high voltage transmission lines around the site. The site is visually buffered from the west and south by earth berms associated with the Winnipeg Floodway and the Deacon water supply reservoir.

There are likely to be concerns raised, however, regarding impacts on some homes along P.R. 207 and on operation of the City's water supply reservoir.

Property concerns will be addressed by Hydro in direct discussion with owners.

Manitoba Hydro is confident that the station and related power lines will present no adverse effects on the City's water supply or associated facilities. These and related issues will be discussed in detail in the Riel Environmental Impact Assessment.



Preliminary Concept for the Riel Converter Station

Other Potential Sites

Seven additional sites, located on undeveloped parcels of land, were identified and compared to Deacon. These sites appear to be developable, subject to confirmation on the basis of detailed design studies. They constitute a representative sample of site types considered to meet the selection criteria and are located in all directions from Deacon.

Five of the seven additional sites are adjacent to the key north-south or Floodway right-of-way. Three of them – Lyncrest, Floodway West and North Transcona – are immediately west of the Floodway. The other two – Floodway East and Prairie Grove – are immediately east of the Floodway.

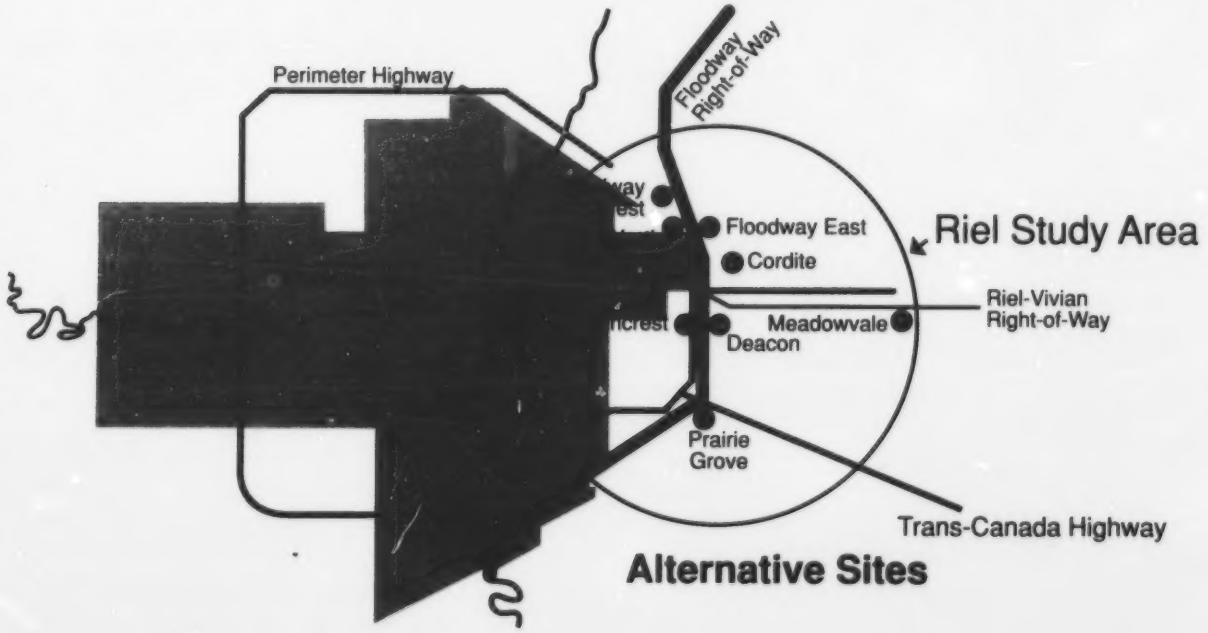
One site – Meadowvale – is east of the critical transmission line junction along the eastern Riel-Vivian right-of-way.

And one site – Cordite – is independent of all existing rights-of-way.

It was clear from the outset, however, that any alternative would be farther away than Deacon from the critical junction of Riel's associated transmission lines. To varying degrees, therefore, all of the alternatives would require acquisition of more property for the station and associated transmission line rights-of-way. Consequently, they would involve greater property-related impacts.

Lyncrest

Of the seven other possibilities, only the Lyncrest site has the advantage of being close to the critical junction of existing transmission lines. Lyncrest is technically poorer than Deacon, however, because it would involve a costlier and more complicated connection to Riel's associated transmission lines. As such, Lyncrest would need more property acquisition than Deacon, but less than the other alternatives. Furthermore, while development constraints associated with the nearby Lyncrest airfield would not be of major significance, a major transmission corridor crossing of the Perimeter Highway would be required.



Floodway West

The Floodway West site could accommodate the transmission lines initially required for Riel. However, it would require extensive right-of-way acquisition for the station's long-term development, including a major corridor in proximity to a number of rural residential properties. The increasingly urbanized character of the area, the complexity of property ownership patterns and transportation-related constraints are among other disadvantages of this site. The site has similar functional disadvantages to other sites west of the Floodway. Its property-related disadvantages are even more significant, however, due to the limited amount of available property in the area and the proximity to the Perimeter Highway.

North Transcona

The North Transcona site has a similar character to Floodway West. Its disadvantages would be aggravated, however, since it is the most heavily urbanized of the alternatives and is thus potentially more sensitive to the visual and other property-related impacts of the project. An advantage of the site, on the other hand, is its industrial land use designation and its closer proximity to the critical right-of-way junction, thus requiring less property acquisition.

Floodway East

The Floodway East alternative is also north of the junction. Its advantage is that, like Deacon, it is east of the Floodway and offers a simpler connection to existing and future transmission lines. At the same time, like North Transcona and Floodway West, it would require a new corridor in proximity to a number of existing residences.

Prairie Grove

Prairie Grove is similar to Floodway East. In addition, however, it would require a major line crossing over the Trans-Canada Highway and would be closer to areas of urban development at Prairie Grove and Deacon's Corner.

Meadowvale

Meadowvale, like Deacon, would adversely affect only a few houses. This advantage is offset by its distance from the urban load centre and from the Floodway corridor component of the proposed transmission ring. Meadowvale's principal disadvantage, therefore, is the need to acquire additional rights-of-way, resulting in further property impacts, to connect the necessary transmission lines back to the Floodway right-of-way. Transportation, infrastructure and other services also are less well developed in the Meadowvale area.

Cordite

The Cordite site is removed from all three of the transmission line corridors which are to be linked to the Riel Station. Selection of this site would thus require new rights-of-way, with negative technical and cost consequences. While Cordite presents an opportunity to reclaim an abandoned industrial site, other adjacent land uses (existing and potential) would complicate project siting.

Conclusion

On balance, none of the seven alternatives provides the combination of technical, functional, environmental and land use advantages possessed by the preferred Deacon site. All of the alternatives involve disadvantages that grow in significance as their distance increases from the key intersection of the Floodway, Riel-Vivian, and Riel-St. Vital rights-of-way.

The Next Steps

Manitoba Hydro has requested provincial and federal government authorization to develop the Conawapa-Winnipeg Transmission Complex.

Regulatory Process

Before approval can be granted, Hydro must submit siting or routing studies, as applicable, and environmental impact assessments for all project components, including the Riel Converter Station. The Riel document and supporting materials are expected to be submitted to the governments in the fall of 1991.

A joint federal/provincial Environmental Review Panel has been established to undertake the regulatory review and to conduct public hearings on the Conawapa-Winnipeg Transmission Complex. This Panel is responsible for making recommendations to the provincial and federal governments. Before any construction work can begin, the formal approval of the Manitoba Minister of Environment and his federal counterpart is required.

Following public consultations on Riel Station, Hydro will complete its final site selection and environmental assessment report and request authorization to develop the station project. A second stage approval will be required for the electrode site and feeder line.

Public Consultation and Comment

Throughout this regulatory process, the public will have a series of opportunities to make their voices heard. The open houses planned to begin in July 1991 represent the next important opportunity for interested parties to provide Hydro with their views and suggestions before the final Riel Station Site Selection and Environmental Assessment Report is complete.

Once this document is submitted to the Manitoba-Canada Panel, it will be available to all persons in preparation for public hearings on the project. Anyone may appear before the Panel in support or in opposition to Hydro's proposals.

Manitoba Hydro looks forward to discussing this project with you.